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who was supposed to have abandoned Livingstone. For his own part he was disposed to believe in the story that Moosa told.

Mr. LAYARD, M.P., asked if the young negroes mentioned spoke the language of the country to which Livingstone was going?

Mr. KENNELLY said some of them were from the Somāli country, where Suaheli was spoken.

Mr. WALLER said the two boys belonged to the Wahiao tribe, which extended over a very wide region in that part of the country. They spoke the language perfectly, and it was for that reason that Dr. Livingstone wished to take them. The Suaheli language would be spoken by the Somāli lads who came from Bombay, so that the Doctor would have the advantage of the Suaheli language as well as the Wahiao. With regard to Mr. Crawford's remark about Livingstone not sending letters to the coast, it must be remembered that the party to which Dr. Kirk's informant belonged was a slave caravan, and it was very likely Dr. Livingstone saw it would be useless sending letters down from the interior by such means, for these traders were too much afraid that their doings would be known on the coast, and could not be relied upon for the safe conveyance of the Doctor's letters.

Mr. LAYARD asked Mr. Waller if, in the event of Dr. Livingstone being killed, he thought these young men would have returned to the coast.

Mr. WALLER. Their first object undoubtedly would be to return to the coast and report themselves to the English at Zanzibar, amongst whom were some they had known on the Zambesi.

The PRESIDENT, referring to a remark by Captain Sherard Osborn, explained that he did not intend to convey the impression that Livingstone would be considered as lost should it turn out that the expedition sent to the head of Lake Nyassa failed to discover any traces of him. All that he said was that the expedition under Mr. Young would set at rest the question whether he was killed at the spot reported by Moosa or not. With respect to his old and valued friend, whom they called their "Objector General," he was astonished that Mr. Crawford stood forward to say he really believed in such a man as Moosa. Upon this point he would read a paragraph from a letter by Sir Thomas Maclear, astronomer at the Cape :—"Moosa's statements are valueless. Mr. Young intended if possible to get hold of the fellow and to take him *vi et armis* to the locality of the tragedy that he reported; but I suspect Moosa would not afford an opportunity to be caught." With regard to the suggestion of Captain Sherard Osborn, that an expedition should go from the north to meet Livingstone, he would state that he had received a letter from Sir Samuel Baker, who was formerly an unbeliever in the safety of Livingstone, and who argued strongly in favour of that view at the meeting of the British Association at Dundee, but who was now of a different opinion. He said in his letter that he wished the Viceroy of Egypt could be induced to fit out an expeditionary steamer to the Upper Nile and Lake Albert Nyanza. If this were done, he (Sir Samuel) would be glad to offer his services to lead it and meet Livingstone in his way northward from Lake Tanganyika.

The following Paper was then read by the author :—

1. *Explorations in Central America, accompanied by Survey and Levels from Lake Nicaragua to the Atlantic Ocean.* By JOHN COLLINSON, Esq., C.E., F.R.G.S.

THE Panama Railroad, admirable as it is, does not nearly fill the requirements of the immense traffic across the Isthmus of America, nor, on account of the deadly nature of its climate and the ineffi-

ciency of its terminal Ports, does it offer inducements to passengers to avail themselves of its otherwise great facilities.

Feeling this further requirement, Capt. Bedford Pim, who had previously distinguished himself in the discovery of the 'North-West Passage' route, carefully examined the harbours and contour of the interlying country, and came to the conclusion that the best opportunity for establishing the much needed communication was by taking advantage of a Bay (since called Pim's Bay), about 35 miles north of Greytown on the Caribbean Sea, crossing the intervening tract of country between it and Lake Nicaragua by rail, steaming across the Lake and connecting with the Pacific Ocean either at Realejo or at San Juan del Sur, both excellent harbours.

He then took the first step to prove the advisability of this route by surveying Pim's Bay. Realejo and San Juan del Sur were too well and favourably known to require further examination, the country between Lake Nicaragua and these two ports had been surveyed and repeatedly examined for canal and railway schemes, and the latter reported as not only practicable but facile of construction; that which remained to be examined was the country between Pim's Bay (the Atlantic Terminus), and Lake Nicaragua,—the most formidable work however of all to the investigator, from the fact of its being a terra incognita, uninhabited and covered with a dense primeval forest and jungle, stretching from lake to ocean over at least 85 miles in a direct line.

In 1863 the first attempt was made to explore this tract; Captain Pim went out to Nicaragua accompanied by two civil engineers, Mr. Salmon and myself. On arriving there the work was portioned out to us in the following manner: Mr. Salmon was entrusted with the part lying between the utmost navigable point on the Rama River and Lake Nicaragua, while to me was allotted the remaining section lying between that point and Pim's Bay. Full accounts of the two expeditions were given at the Newcastle Meeting of the British Association, 1863. Suffice it to say, that after considerable hardships I succeeded in penetrating across to Pim's Bay; and Mr. Salmon, after bravely struggling against want of provisions, desertion, and the tropical downpour of the rainy season, was at last obliged to retreat, baffled and barely escaping with his life, from his endeavour to reach the Lake.

In 1865 another attempt was made to cut across, this time under Colonel Cauty, who, though a hardy backwoodsman accustomed to living for months in the forests, had to succumb, his men finally threatening to carry him back forcibly unless he would consent to lead them back to safety and plenty.

Such was the state of affairs when I arrived in New York with Captain Pim in January of this year; and, at the instance of certain American capitalists, I undertook to cut a clear track through from lake to ocean,—for which purpose I arrived at Greytown on February the 11th.

The hurriedness with which all this had to be arranged left me scarcely any time for preparations; just enough to purchase a few necessary instruments in New York, and none to engage assistants; but luckily on my voyage to Greytown I met, on board, Mr. Deering, an engineer on his way to California, and engaged him to assist me. He became my right hand man, and by his pluck and determination contributed greatly to the success of the expedition.

On arriving at Greytown I found to my regret that an alarm of cholera, from which the natives flee like the Hindoos in the East, had driven them nearly all away, and do my best I could only engage 5 Caribs and one Creole (as cook) to accompany me.

We started up the river San Juan on the 16th of February. But, before leaving Greytown, a word about its harbour and river. Conclusive natural evidence proves that centuries ago the sea covered the entire space now occupied by the mouths and swampy deltas of the San Juan, while among the historical accounts of the country are distinct records of the time, in old Spain's palmy days, when her ships of war regularly sailed up the river and across the Lake to Granada.

Now, a shallow canoe, steered and paddled by dexterous Caribs, can hardly clear, on the crest of the wave, without touching the bar; and light river-steamers with stern-wheels, and drawing when laden only 10 inches of water, can scarcely grope their way from rapid to rapid, whose rocky bottoms strewn with boulders, and whose rapidly flowing current, effectually bar their further passage.

Every year it becomes more evident to all living on its banks or using its stream, that the flow of water is becoming less in the San Juan; and even the least observant native, dwelling on the Lake, will tell how its banks are rising year by year visibly before his eyes, how the River Panaloya connecting the two great lakes is becoming drier every season, so much so that at times lately no water-connection has existed between them. Noting the fact that these lakes are in the middle of the great volcanic range bisecting the Isthmus, which dies out to nothing before reaching the low alluvial shores of the Atlantic, may it not be conjectured that the gradual upheaval of the centre, while the coast has remained almost unmoved, should year by year increase the gradients of the river, and by creating a more rapid flow of water cause the percep-

tible drainage of the Lakes and lower the level of their waters? Also, will not this help to account for the formation of the deltas and silting up of the estuary of the San Juan?

Formerly the river must have flowed out calmly almost on a level from lake to ocean, whilst now the turbid waters, hurrying down with ever increased velocity, carry with them the débris disturbed by the floods of the rainy season, till suddenly they find a level bed; and the resistance of the denser sea-water, with the frequent violent "Northers" of those latitudes blowing full upon them, they are arrested in their course, and deposit the suspended material.

To return—after a laborious ascent of the river, I was landed at the village of San Miguelito with my small party. Commencing work on Monday, February 25th, through the stunted undergrowth that clothes the shores of the lake, and which swarms with gallipatos, those terrible pests of the Tropics, we proceeded with great rapidity; and, on March 1st, had so far advanced, that it was advisable to pitch our first camp. That night we swung our hammocks for the first time in the open air, and in spite of mosquitos slept well.

On Tuesday, the 5th, we entered the forest, which extended from there without break, eastward, to the ocean. Up to that time we had been traversing the savannahs which skirt round the borders of the lake, and lie inland in places for many miles. These savannahs are immense plains, sometimes slightly undulating with hillocks clothed with trees standing up, at intervals, like islands in the long grass which will often overtop the heads of the horsemen. In crossing these savannahs, and for some time after entering the forest, we suffered dreadfully from want of water, and were only too grateful to obtain any dregs that might be left in the pools frequented by the Dantes or Tapirs (*Elasmotherium bairdi* or *Tapirus bairdi*), and used by them alike for drinking and bathing.

We could trace the commencement of Cauty's old piquete, on entering the forest; but, as I soon found it inclining too much to the southward, I decided to quit it and strike out an independent line.

Friday, the 8th, one of my men, who had been despatched on Wednesday to San Miguelito for provisions, arrived with a welcome supply; but what we needed most was water, and had it not been for a large vine ("Bejuca"), which seems planted by Providence in dry regions, where alone it flourishes, and which yields on being cut a moderate supply of wholesome clear water, our sufferings would have been unbearable.

The forest now began to take a more distinct character, as inter-

mixed with the everlasting palms, india-rubber trees, sapodillas, cedars, and, further on, mahoganies occurred in magnificent groves, sprawling their enormous roots over acres of ground, and rearing their vast height from the jungle beneath almost, as it seemed, up to the clouds.

Tuesday, the 12th, I shot four guans (*Penelope*), the smallest species of turkey inhabiting the American forests. The country now became more broken up, our course crossing several spurs of a high range, running to the north of us, west and east.

Mr. Deering began to feel the effects of drinking the filthy water we had been obliged to put up with. On Saturday, the 15th, however, greatly to our joy we came on a watercourse with several large and clear pools.

Monday, the 18th, we crossed the first running stream since leaving San Miguelito, and on the following day three Caribs, whom I had requested Captain Pim to send me from Leon, arrived; one of whom, Perry by name, an elderly man, I installed as "Boss" of the party.

Our total distance up to leaving off work on Saturday afternoon, was $17\frac{1}{2}$ miles, in 24 working days; not so bad, taking into consideration the small number of hands. But now, having had a fair opportunity of comparing the work of these Caribs with that of the Mosquito and Woolwa Indians, employed on my first expedition, I must say that the latter were by far the best workmen. There were two very serious drawbacks to the Caribs: firstly, they were excessively particular about their food and personal comforts; if they had not for every meal plenty of meat, dampers, and vegetables well cooked, there was always great grumbling and an attempt to shirk work; they also insisted on having blankets and mosquito bars for the night, which increased the bulk of our loads very seriously; and, secondly, they always have some man among them, generally the biggest and laziest, whose dictum is invariably followed in the blindest and most obstinate manner—reasoning is wasted on them. The Indians, on the contrary, though they certainly complain if not kept well filled, are content with anything as long as they have sufficient of it to create a sense of repletion. When provisions were not plentiful, they would often sit up all night boiling and eating eboe-nuts (*Dipterix oleifera*), which quite satisfied them if they could obtain enough. As for wardrobe it was all carried in the shape of a small cloth round the loins. Their respect for a white man is very great, and the virtue of obedience is rarely questioned by them.

The country which we had passed through, nowhere in our course

attaining a greater height than 400 feet above the level of the lake, had for the last few miles been broken up a good deal by isolated hills; but, on Thursday the 28th, we crossed a considerable plain stretching as far as the eye could reach to our north, and bounded on our south at a distance of 5 or 6 miles by the spur of a range running north-east and south-west, which we crossed on Saturday, at a height of 716·94 feet above the lake, and at a distance of 21 miles 528 yards from San Miguelito.

On that same day in the evening, on coming into camp, I was gladdened by finding that Lieutenant Oliver, R.A., had arrived with four men, a mule, and two bullocks laden with provisions. Mr. Oliver, at my request, volunteered to remain with us and give his valuable assistance to the expedition. As an instance of the difficulty in travelling through this country I may state that Mr. Oliver started with six bullocks, lightly laden: only two of which arrived, the rest dying on the way.

In the morning one of my men shot a wari (*Dicotyles tajacu*), the first large animal which had fallen a prey to us; we had shot a few turkeys before, but it was remarkable how much less game there was in the country than formerly. No animals seemed to be plentiful now, except jaguars. The natives accounted for the phenomenon in this wise:—Two years ago a terrific hurricane, similar to the one which has recently devastated St. Thomas and Tortola, swept over the country, utterly destroying Blewfields, and laying low vast tracts of the forests. The wild animals and birds were destroyed by myriads, and sought refuge in the very roads and houses of the little clearings on the coast of the ocean and the lake, where they were killed by the inhabitants. Since then hunting has become a profitless employment; but the jaguars, too hardy and cunning to be destroyed by the same means as the other game, have grown bolder and more ferocious, attacking men wherever they meet them, and even taking the town of Blewfield's by storm. I was assured by most credible witnesses, that while we were in the cutting seventeen jaguars marched into that place one morning, and frightened the inhabitants so much by their numbers and appearance, that they shut themselves up in their houses while the jaguars killed every goat in the place—the only animals kept on the Mosquito coast.

Tuesday, April 2nd, 24 miles from San Miguelito, we struck a large stream running to the south-west. Accompanied by Mr. Oliver, I explored it for about a mile both ways. Along its banks we found in many places "machete" cuts, and I concluded that it had been visited by rubber-men, as no one else would have cared to

penetrate to such a place. I set it down as a tributary of the Tule, the only river between San Miguelito and the San Juan, visited by rubber-men. Height above lake at crossing, 202·02 feet.

A large river was met on Friday, running to the south-west, and crossed $26\frac{1}{2}$ miles from San Miguelito at a level of 288·68 feet above the lake. This, I feel confident, is the main Tule River, and the one we crossed on the 2nd, a tributary from the north. As I felt pretty confident, from former observations, that the course of the Rama River is nearly east and west, and that it is of considerable length, I now looked forward to attaining the summit-level dividing the watersheds of the Atlantic and lake.

We came across the Soupar palm (*Guilielma speciosa*) on Saturday the 6th, for the first time; this palm is universally grown by the Indians round their houses, and its fruit, tasting much like a yam, is boiled and eaten when ripe. The tree is about 60 feet in height, with a straight stem covered by regular bands of long black prickles, used by the natives as needles; the appearance of the leaves on the top is similar to the cabbage-palm.

After ascending gradually for the next few days, we, to my delight, espied for the first time a grove of four eboe-trees (*Dipterix oleifera*): I took this as a certain sign of our proximity to the summit-level, as none of those trees grow on the lake and Pacific slopes of the isthmus. At the same time the vegetation, as if by magic, changed; on the lake slope the woods are principally hard and small-leaved. Mahoganies (*Swietenia mahogani*), cedars (*Cedrela odorata*), lance-wood (*Duguetia quitarensis*), lignum vitæ (*Guaiacum officinale*), and india-rubber (*Castilloa elastica*) are distinguishing features; the jungle is exceedingly tough, in many places miles of prickly pear (*Bromelia karatos*), bamboo, with "bejucas," and vines, which tried the sharpest "machete" and strongest arm to cut, while the surface of the ground, except in the bottoms of the valleys, was arid, stony, and so heated that our feet were burnt and blistered by it; watercourses were comparatively few, and many of them dry. Such a country was quite unfamiliar to my previous experiences, but now every day the changing vegetation and aspect of the country reminded me more and more of the Mosquito coast. The vines became green and tender, the great coroso and cabbage-palms were now mixed with the swallow-tail (*Geonoma*), so useful for thatching, and the ribbon-like leaves of the *Circuligo latifolia*, while the prickly and club-rooted zanona (*Socratea*) would mingle their foliage with the locust-trees (*Hymenæa courbaril*), the entada with their mahogany seeds; and the swelling trumpet-trees (*Cecropia peltata*), sarsaparilla (*Smilax medica*), and the clinging vanilla began to appear, and the

invaluable silk-grass (*Bromelia*) took the place of the prickly pear. Lovely tree-ferns gave their incomparably delicate appearance to grace the vegetation; running streams occurred more frequently, and the ground became springy and cool under our feet, while it acquired that rich black colour so suggestive of fertility.

Thursday, the 11th, the day we first descried the eboe-trees, I had to try the skill of my men as bridge-constructors. In the bottom of a level valley, a small stream wended its way through peat, which it saturated, and thus rendered most treacherous for our animals. Selecting the narrowest crossing, some 30 feet, in less than half an hour we threw over it a substantial bridge; but alas! for the impotence of the human will against a mule's; though our now solitary steady-going ox crossed with perfect safety, neither force nor persuasion could induce those obstinate brutes to trust themselves to it, and finally they all made a frantic rush into the bog, where, sinking up to their middles, they philosophically stood stuck fast. Their loads had now to be taken off and carried across by the men, and the stubborn beasts pulled out by main force by their ears, legs, and tails,—all the time resisting as hard as they could; and sometimes, just as they were being landed on the bank, succeeded in breaking loose and rolling over and over till, at last, they were sticking again in pretty nearly the same place they had been rescued from.

During the night we had a serenade of jaguars, or, as the natives call them, tigers; and, in the morning, their tracks were visible all round the camp.

As we ascended the great dividing ridge, our compasses, which had often before shown, near any ranges of hills, singular variations from true north, became more and more affected and unreliable, so much so that they were utterly useless. The iron in the basaltic rocks would have, perhaps, explained this, but that the variation until we passed the summit was always much to the east, while the great ridge stretching down from the northern part of the Chontales district of Nicaragua, in the direction of the San Juan River, and becoming less and less as it went southward, would have naturally attracted the needle closer to true north. More extended examination of the tract north and south of our line will, doubtless, reveal the cause of this curious phenomenon; but, while unaccountable in itself, it explained to me one of the causes of Cauty's ill-success, as he, unacquainted with the use of the theodolite, trusted to his compass-bearings, which took him a long way south of his true course into the heart of the great valley of the Indian River. Other curious causes of variation were some of the enormous ma-

hogany and wild cotton-trees (*Ceiba bombax*), which would often attract the compass as much as 3° .

On Saturday, April the 13th, we at last attained our summit-level, 619·86 feet above Lake Nicaragua, and 747·86 feet above the Atlantic Ocean level, at a distance of 31 miles 1448 yards from the former, and 69 miles 1145 yards from the latter.

Our provisions were now getting very low, and we were obliged to make our meals off rice mixed with—whenever obtainable—a delicious wild honey collected by a very small species of bee, not larger than an English house-fly.

Tuesday, the 16th, spite of promises of rewards and increased pay, the six Caribs and one Spaniard deserted us, stating as their reason that they could not longer live on frijolas, which gave them in their expressive language “belly-swell.” Our party was now reduced to ten in all; however, not the slightest hesitation was shown, but a firm resolve prevailed to reach the Atlantic in spite of all obstacles.

Next day a Spaniard, who had been surveying for me at Realejo, arrived at our camp accompanied by an American and a native, informing me that Captain Pim was coming to pay us a visit the next day. Early on the following morning he arrived at our camp, which was named after him “Bedford Camp.” Shortly after his arrival we went on ahead to the cutting party, which had been despatched to work early in the morning; and, to complete the pleasure of the visit, we found that the party had just struck a large river running in our course to the east, over large basaltic boulders and in deep and wide pools. This was by far the most considerable river we had yet met, and turned out to be, as we assumed at the time, a tributary of the north branch of the Rama River. I named it “Susannah River,” after Mrs. Pim; its distance from San Miguelito was 34 miles 870 yards, and the water 398·62 feet above the Atlantic.

Next day, Good Friday,—a day religiously kept by the Spaniards—was declared a holiday. Captain Pim left us in the morning, expressing an intention of accompanying a party, who, according to instructions I had left at Greytown, were to start on the 25th inst., with provisions to meet us at Rama station. The following morning we left Bedford Camp, which was $33\frac{3}{4}$ miles from San Miguelito, and after crossing the river three times, struck it again at some beautiful falls, which were named after Mrs. Collinson, “Cecilia Falls.” The river above them lay in a deep, wide pool, and suddenly meeting a breastwork of basaltic rock, was confined in a narrow channel, over which one could jump during the dry season, fell

into a deep hole in the rock about 15 feet below, and then rushed down boiling and bubbling over a layer of rock strewn with boulders. The rock presented a very curious appearance, from the fact of its being covered all over with circular holes, from 6 inches to 3 feet deep, created by the action of shingle worked round and round by the falling water. Here we observed a very curious small lizard (*Anolis sp.*), which has a yellow pouch under his breast which he expands on being frightened, and often intimidates his foes by the action. He frequents the banks of rivers, and is very fond of basking on dry stones in the water.

The work of moving was now getting day by day more laborious, on account of the soft bottoms of the innumerable small streams we had to cross, and in which the mules invariably stuck fast.

Our course again crossed the Susannah River, which had been winding round some hills to the north, on Saturday, the 27th, at a distance of $39\frac{1}{2}$ miles from San Miguelito, and at a level of 251·27 feet above the Atlantic.

Before reaching it we came on a very curious cave, hollowed out of the side of a high hill: the orifice was about 2 feet in diameter, swelling out in the interior as far as we could see to about 6 feet each way. A few days afterwards we discovered two similar ones. The natives declare them to be made and inhabited by a large owl.

The weather up to this time had been unusually fine, not more than three wet days since quitting San Miguelito, but at night a shower was a frequent occurrence; the temperature was often very chilly, about 2 o'clock in the morning, after crossing the dividing ridge, but before doing so the nights were nearly as sultry as the days.

Our animals were now reduced to four by the loss of another mule, two of which were hardly of any use, showing unmistakable signs of giving in. On Tuesday, 30th, the last horse died, and the next day our bull was nowhere to be found. The supply of grass for the animals in these dense forests was very limited, and we were obliged to let them roam at their will during the night, so as to forage for themselves. The most diligent search could not discover the bull, and we were, to our sorrow, compelled to conclude him devoured by jaguars, or lost beyond chance of recovery.

On Wednesday, May 1st, we found the Susannah River running parallel and quite close to us, and suddenly on nearing it on our right we came full into a much larger river, running to the south, crossing our course at right angles, and then turning sharp round to the east, in which for the first time since quitting the lake numerous alligators appeared swimming about. The joy at this discovery was

beyond measure: our provisions, with the exception of a few frijolas, expended, our carrying facilities reduced to two poor mules, barely able to totter along, the men had fancied that the Susannah was no tributary of the Rama, and that following it as we did, day by day, with no perceptible increase in its volume, we might go on until death by starvation should kill us one by one. This melancholy picture seemed ever before their eyes; but when we suddenly, without notice or warning, came on the junction of our river with one three times its magnitude, running majestically between banks of long "scutch"-grass, with the broadleaved *Heliconia bicolor* flourishing in the first open sunlight met during the wearied time we had toiled from San Miguelito, the very sight of the sun and cloudless sky, after the darkness and ghostly forests, seemed to give fresh light and vitality, while the appearance of the river-banks,—so suggestive of the San Juan and other well known streams—gave to their imaginative minds omens of a speedy arrival at the habitations of men.

This fine stream was undoubtedly the north branch of the Rama, and was crossed by us $41\frac{1}{2}$ miles from San Miguelito, at a height of 229·64 feet above the Atlantic, and could not be very far from its junction with the south branch, the furthest point to which our former explorations of the river in 1863 had extended. A camp was immediately pitched here, as the "scutch"-grass on the banks offered such a capital opportunity for the mules to recruit. In the afternoon Mr. Oliver had a very narrow escape from a puma (*Felis concolor*) which sprang at him when jumping across a stream, from behind a tree overhead. Though his gun was only loaded with B.B. shot, fortunately the two charges settled the brute, some of the shot penetrating his brain; his skin was soon peeled off, and preserved as a trophy.

We now were obliged to come to the conclusion that the two remaining animals could not possibly carry baggage for all; and I made up my mind to have a raft built, so that, while keeping the survey as close as convenient to the river, the things might be floated down from camp to camp. Such being my decision, I started off with the two mules, a tent, and a few necessities, with the cutting party on the 3rd, with the intention of working until we again hit the river, when I would despatch a messenger back to the Junction Camp, where I had left instructions to have a large raft built of "mountain-mahoe" wood. This is an invaluable tree to the natives in that land of many lagoons and rivers, from its extreme lightness, as also from its affording a species of brown cotton, very soft, and much used by the better class of Creoles for stuffing mattresses and

pillows; when growing, it is extremely like, and hardly to be distinguished from, the trumpet tree.

We worked at the cutting on the 3rd until quite dark, and not having yet reached the river, were forced to camp in a bamboo-thicket with no water, so that it was necessary to send men back over half a mile with lanterns to obtain sufficient to quench our thirst. At about 9 o'clock, however, next morning, we heard a great noise of falling water to our right, and, cutting a narrow track through in the direction of the sound, we came on some beautiful falls of the Rama, not unlike, though much larger than Cecilia Falls, distant from San Miguelito 44 miles. A man was at once despatched to the party behind under Messrs. Oliver and Deering, with instructions for them to raft it down the river at once; and in the evening we were joined by the whole party.

That evening I held a council, in which our position was seriously considered. We found on examination that all the provisions we had left were frijolas enough to supply two meals for all hands, and absolutely nothing more. I therefore decided to start at daybreak on the morrow down the river on the raft with Oliver, two Spaniards, and two Caribs, to try and discover the party from Greytown with provisions, leaving Deering in command of the remainder, with orders to follow us in two days if we had not then appeared.

Our camp was pitched that night about 200 yards from the river, in a thick bamboo-brake; and during the evening we were disturbed several times by hearing wild beasts walking very close to us: however, about 10 o'clock, well worn out with the fatigues of the day, Oliver and I fell asleep, though not so Deering. As usual, our hammocks were slung in parallel lines under the tent, mine in the centre. Deering, the only one awake, fancied he heard footsteps unpleasantly close to our camp, was just on the point of awaking me, when a branch cracked, as if an animal had trod on it; some heavy body jumped over him, just striking his hammock's edge; the same moment I was struck a tremendous blow on the hip, capsized out of the hammock, and found myself rolling on the ground, trying to extricate myself from my blanket, with every body awake, and hallooing out "Tiger!" The noise frightened the brute off; he had evidently made a miscalculation, luckily for me, and instead of alighting on top of me with his claws, jumped a little low, and struck me with his head. We heard the brute and some companions softly walking round us all night, and were uncommonly glad when daylight appeared.

Leaving all our provisions, except enough for one scanty meal, with Mr. Deering, we commended ourselves to Providence,

and started on our hazardous voyage on Sunday morning, the 5th May.

At first we glided down the river calmly enough, the men pushing our raft along with their "polancas;" but after about a couple of hours we came on rocks and rapids, over which the raft could not be passed, but had to be taken laboriously to pieces, and pulled over stick by stick. While this operation was being performed we saw a jaguar of an extraordinary size, fully as large as a Bengal tiger, cross a small tributary running into the river on the right, and make towards us. The raft was fortunately ready for embarkation again; so we deprived our friend—who I believe would have attacked the whole party—of the chance of a meal. I must here note that, like all else, our bullets had long since been expended, and it would have been foolhardiness to court a contest with such a brute against B.B. shot.

During this day no less than five rapids were passed, and so laborious was the work of taking to pieces and putting together the raft, that we travelled scarcely more than 2 miles. The river was a succession of long pools, 15 to 20 feet deep, and about 150 feet wide, with scarcely a perceptible current, connected sometimes by rapids, with gravelly bottom strewn with boulders, and at others by crevasses in the basaltic rocks, in which the water would be confined in narrow, tortuous, and grimly black passages, down which it rushed boiling and frothing to another silent pool.

At the head of one of these romantic chasms we camped the first night. The wild animals always use these contractions of the river for crossings, as they can jump from one rock to the other without entering the water. So many jaguars and tapirs, who have a peculiar penchant for trampling out fires, surrounded us during the night, that we had to keep watch turn by turn for fear of an attack, while those not on duty, having left their hammocks behind, would seek the most comfortable holes in the rocks and curl themselves up to sleep until their turn for watching arrived.

The 7th, Tuesday, dawned on us, and yet no signs of the party we were in search of. Still rapids and pools alternately presented themselves, and so frequently came the former, that more than three quarters of the day we were up to our waists in the water, passing our "Mountain Mahoe" sticks down them. An iguana furnished breakfast for us again, and after eating it, resuming our voyage, we floated down a long beautiful stretch of the tranquil waters of the river. On a sudden, turning a sharp corner, a cheer burst from all our lips. There, less than 200 yards ahead of us, on a prominent rock jutting out into the river, was Captain Pim, accompanied by

Charles, the "Boss" of my 1863 expedition, and another Creole, who represented my provisioning party. The Atlantic and Pacific were at last united, and all our anxieties were at rest.

After the first joy of meeting had subsided, on inquiry I found that the bulk of our provisions had been left outside the bar of the Rama, in a sheltered nook, called Grindstone Bay, as the sea was running too high at the time to admit of a safe entrance for a loaded canoe.

Collecting together all the party had brought up with them, I sent some men back to Mr. Deering to inform him of our success and stay his further progress down the river.

I then continued the descent of the river, and, following the party to where their canoes had been left, we came on the grandest falls yet seen. I had often heard rumours from the natives of the "Big Falls," just above the junction of the north and south branches, and of their terrible nature, but until then had set down much to their fondness for exaggeration. But I was rapidly undeceived, and understood how easily the superstitious feelings of the Indians would be worked on by the sight that now met my eyes. The river running its placid course between low banks covered with "scutch"-grass, wild plantains, tree-ferns, and the venerable spreading Indian fig-tree, clothed with a matting of creepers (*Bauhinias*), and vines falling down over the water from their overhanging branches, like a curtain, suddenly changed; a great upheaval of volcanic rock, which had evidently, by damming the river, formed the long deep pool above, barred its progress, but opened a narrow winding passage, down which the water rushed for over half a mile, and dashing up against the caverns it had hollowed underneath, often obstructed in its course by immense masses of rock hurled by some convulsions of nature into the stream, sent for miles an ominous sound like confined thunder. The rocks bare of vegetation, and frowning up black and perpendicular from the waters, completed the weird contrast of the picture.

The following day, the 8th, we arrived at Rama Station, an old Indian village, my former starting-point. We then continued our voyage as far as the first inhabited Indian village. The chief, who had assumed the name of "Shepherd," soon recognised me and held out the right hand of fellowship. This man is about the finest Indian I ever met; a Rama, though perhaps hardly pure, as he has a slight moustache, but preserving all the other characteristics, clean shining brown skin, height fully 6 feet (though from his immense breadth and muscular power he seemed much shorter), with an intelligent expression and severe and determined countenance.

He soon stirred up his wife, who, according to their rigid laws, may not speak to any one out of the tribe, and ordered her to prepare some "mishla" for us, but, at my request, without the chewing process. This *mishla* is a drink prepared in a similar manner to the "kava" of the South Sea Islands out of cassada (*Jatropha manihot*), ripe plantains, pine-apples, and cocoa-nuts.

Captain Pim and Mr. Oliver shortly after went down the river with my men, intending to send the provisions up to me, and then proceed to Greytown for more. I spent the night with my friend Shepherd, who made me a lot of presents; among others, a fine bow and arrows, the former made from the soupar palm (*Guilielma speciosa*), the latter from the dry stalks of the sugar-cane (*Saccharum officinarum*) blossom, tipped with an exceedingly hard wood, called "ouka."

On Saturday, the 11th, I started up the river again with my provisions, which had arrived early in the morning. In the evening we reached Mr. Deering's camp, and soon settled our morrow's work.

Our great anxiety now was to reach Rama Station, and thus complete the work before the rains came on, which swell the streams so as to render them impassable and fill the undrained valleys with water. They are always expected about the end of May or first days of June, and we had only sixteen working days left in the month, with a distance of $16\frac{1}{2}$ miles still to cut.

We, therefore, all put our whole energies into the work, and had proceeded so far that on Saturday, the 18th, camp was moved below the "Big Falls," but, unfortunately for us, our line did not come close to it; on leaving off in the evening we had, therefore, to follow the course of a small stream until it emptied into the river, and then wading down as far as we could, were finally obliged to stop on account of the darkness and depth of the water. Swimming would have been madness, as the water was swarming with alligators and crocodiles (*Molinia Americana*); and, had we escaped them, in all probability we should have been dashed to pieces over some of the numerous falls and rapids. Night coming on, we lay down in our wet garments on a flat rock, and most of us fell asleep; but about one in the morning a halloa awoke us, and there was Charles with a canoe and lantern, come in search of the missing wanderers.

On Friday, 24th, having given the cutting party, which was now abreast of the junction of south and north branch of the river, their direction, I explored the former in a canoe with Charles and roughly surveyed its course for a few miles. It seemed to contain about the same volume of water as the northern branch, but to be a

calmer and less turbulent stream. Its course as far as I went was nearly due south, but I do not estimate its length as very considerable, for, if so, it would soon reach the watershed of the "Rio Indio." At its junction with the main stream was an old plantation, with a fair supply of plantains and bananas, and a little further south we discovered on the banks of the river part of an old "rubbing stone" used by Indians and Spaniards for preparing chocolate. Higher than this I feel assured that no Indian has ever penetrated, but that, terrified as now by the sight and sound of the "Big Falls," the numerous race which must once have peopled this river contented themselves with the tranquil waters of the lower Rama, where they could paddle their canoes in safety, and that we were the first who had penetrated through these sombre forests, from lake to ocean.

The rains were now commencing to set in, and the average of fine weather was not more than two hours a day; the warm steam arising from the hot deluged ground penetrated our instruments and tried our patience while using them to the utmost.

On Monday, the 27th, we crossed the mouth of "Charles Creek," 55½ miles from San Miguelito. This creek crossed Mr. Salmon's former line; but I am inclined to think he must have kept too much to the north, as Cauty kept too much to the south: we certainly, keeping between both, hit the right point.

We moved out camp on Thursday, the 30th, to "Duck Island," in the middle of the river, facing a grand range of hills running down from the northward to within a quarter of a mile of the river.

At 1:40 P.M. on Monday, June 3rd, we cut out at last to Rama Station, and on Wednesday Mr. Deering brought his levels to a termination, and our last and 37th benchmark was cut and engraved at a distance of 61 miles 854 yards from San Miguelito, and a height of 115.17 feet above the mean level of the Atlantic at Pim's Bay. The afternoon of that day I occupied in exploring the creek opposite Rama Station, but I soon found it contract so much as to render the progress of a canoe difficult. At its apex with the Rama River were the ruins of an old Indian village, with curious carvings of figures on the trees.

The next day we all started down the river on our homeward way, stopped at Shepherd's to pay him a farewell visit, and after killing a mountain cow and some wari we arrived at "Tincum's Village," at the mouth of the Rama, at 6 o'clock the next morning, cold and drenched through with the incessant rains.

Hastily swallowing a cup of coffee, we started off for the bar, knowing the necessity of crossing it as soon as possible, for fear of one of the gales which often occur at that season of the year arising

and stopping our progress. To my intense disappointment the bar was declared impracticable, there being three distinct lines of breakers, one outside the other; two were the limit, my men said, they could cross in safety.

Tincum's village, a collection of about twenty huts, was certainly a model Indian settlement, the huts were all beautifully built of stout posts of lancewood (*Duguetia Quitarensis*), filled in with the tough "sillico" stems, and roofed with the leaves of the swamp-growing "scumfra." They were incomparably superior to the wretched Spanish hovels of San Miguelito, and showed strongly the superiority of the pure Indian over the mongrel descendants of his race and the Spanish conquerors. The hatred of the Ramas for the Spaniards was intense, and only the friendly feeling of the former towards me saved the latter from destruction. Before parting, Shepherd gave the Spaniards a hint that if they ever came to his country alone, he would have the greatest pleasure in killing them all. The statement was made in such a serious matter-of-fact way that I could not help laughing; but the poor Spaniards, gazing on the giant's proportions, evidently did not feel safe or happy until they had left him some way behind.

On Wednesday, in spite of my men's warning of the still dangerous appearance of the bar, my patience was exhausted, and I determined to try it; packing our canoes we steered steadily for it, and watching our opportunity darted over with a slight ducking, but in perfect safety. That evening we slept at "Great Grindstone Bay," as the men feared the Greytown bar at night. Sandflies innumerable bit us during our hasty sleep. At 11 P.M. we re-embarked, had plenty of rain, and arrived at Greytown over a tranquil bar at half-past 8 next morning. So ragged and wet and worn, without shoes or stockings which had long since quitted us, were we on arriving that the honest people hardly knew us; but a good sleep, wash, and decent clothes, soon put us to rights. Our health, notwithstanding all hardships, had never been better, and when we embarked in the *San Francisco* for New York, on the 22nd of June, we could safely say that having tested the climate of Nicaragua and Mosquito in its worst aspects, it had not hurt us.

The results attained by this expedition are important. The penetration across from the lake to the Atlantic, with a summit-level of only 619·86 feet above the former, does away with all the fears that previously existed of there being inaccessible and lofty mountain ranges to bar the construction of a railway. Taken as a broad fact, the only range of importance, the Cordilleras, which in other parts of the isthmus forms so impassable an obstacle to railway construc-

tion, has here by a freak of nature, with the exception of a few of its highest peaks, been obliterated and covered up by Lakes Managua and Nicaragua, down which its central line runs.

Before, however, reaching the northernmost lake, the Cordilleras shoot out two subsidiary ranges, one on each side, which enclose and form the watersheds of the two lakes. In the range running down between these lakes and the Pacific Ocean, a pass at the height of 615 feet has been discovered; while in the other range an almost similar altitude of 620 feet has been disclosed by my recent surveys.

The two secondary ranges running north and south have, in their turn, numerous spurs, between which the rains make their channels and flow off west and east, as in the case of the Tule and Rama rivers.

Another point of importance—the question of impassable swamps—has been set at rest: absolutely none exist. The only signs of marshy ground we discovered was on the margin of the lake, where in some places the low-lying parts of the savannahs are almost below the water-level; but as these parts, forming “*esteros*” in the wet season, lie between low hills of 50 to 100 feet in height, running east and west in the natural drainage direction of the country, they can be avoided entirely.

A great deal might be written of much interest on the geological features of the country, but time will not allow me to do more than indicate them. The parent and secondary ranges of the Cordilleras are volcanic; and though to the north of Lake Nicaragua and between that lake and the Pacific much good limestone exists, on our course between the Lake and Monkey Point, with the exception of sandstone, the rocks wherever apparent were always volcanic,—basalt, porphyry, and tufa overlying entirely the former strata.

These volcanic rocks, except on the tops of the hills, are covered with a subsoil of yellowish earth, formed by their own degradation, taking in places the consistency of clay, and in the deeper valleys forming a soft conglomerate with large masses of flint imbedded.

In its turn this subsoil is covered by rich loam formed of decayed roots and vegetable matter, which watered by the tropical showers is astonishingly fertile.

In conclusion, let me observe that this expedition—undertaken without adequate means or time, dreading the approach of the rainy season if it relaxed its eager speed for one moment—was naturally imperfect, and will necessitate more searching and leisurely surveys before the best and most economical route can be ascertained; but it has succeeded in its grand object by demonstrating not only the

practicability, but also the advisability of the route for a Transit, and has laid the basis for all further examinations by having good and durable bench-marks cut along the line at short intervals, with their heights and distances from lake and ocean accurately measured and recorded.

APPENDIX.

WOOLWA VOCABULARY.

Libra.	Woolwa people.	Ahmakouting.	Sleeping.
Wahi.	Brother.	Meouhka ahma-	To sleep.
Al.	Man.	kouting.	
Yel.	Woman.	Toonik.	Head.
Sirou backar.	Girl.	Tas.	Cloth to wear
Al backar.	Boy.		round the loins.
Backar.	Young.	Kalki.	Foot.
Yalki.	Wife.	Kinki.	Hand.
Alkimuk.	Husband.	Wakki.	Plantains.
Pamki.	Tapir.	Inkkini.	Bananas.
Nowarpowka.	Red tiger.	Um.	Corn.
Powka.	Red.	Sussunka.	Beads.
Nowar.	Tiger.	Simming.	Fish-hooks.
Nowar bulka.	Spotted tiger.	Sooksuwookka.	Cord.
Nowar burruska.	Black tiger.	Asnar.	Cloth.
Bulka.	Spotted.	Soobba.	Pot.
Burruska.	Black.	Watikah.	Banana bird.
Pichea.	White.	Vecah.	Hare.
Sunna.	Deer.	Kee.	Rock.
Sowie.	Wari.	Sou.	Ground.
Cassi.	To eat.	Souassung.	World.
Caskouting.	Eating.	Nowal.	Devil.
Deekoting.	Drinking.	Waikou.	A god.
Soopokoting.	Sucking.	Mah.	Sun.
Deeko.	To drink.	Waikoo.	Moon.
Yappoo.	Alligator.	Mahbruska.	Sky.
Kahama.	Iguana.	Waslouti.	Rain.
Was.	Water.	Ewi.	To die.
I warra.	Come here.	Yowahkooting.	To walk.
Baina warra.	Come here quick.	Yoolbutiang.	To talk.
Yowanakou.	Let us go.	Mahdi.	To-day.
Koorring.	Canoe.	Yun.	To-morrow.
Wahinah.	Paddle.	Dummi.	Yesterday.
Koobil.	Knife.	Koo.	Fire.
Seeban.	Bow and arrows.	Koolaka.	Firewood.
Keeddak.	Axe.	Pun.	Wood.
Oorrus.	Monkey.	Quassika.	Hammock.
Wumnii.	Curassow.	Keettung.	Waterfall.
Wunkuruman.	Guan.	Tookwunnah.	Big.
Woomalo.	Partridge.	Was.	River.
Moolakoos.	Peccary.	Tooki.	Mouth.
Yamka.	Good.	Meekduka.	Eyes.
Dootka.	Bad.	Anaki.	Teeth.
Awai.	Yes.	Tapahki.	Ears.
Aissou.	None.	Bas.	Hair.
Eessou.	No.	Ki.	Mine.

Yungdeeki.	Yours.	Waya hal.	Mosquito man.
Washbiloo.	Mishla.	Waya yel.	'' woman.
Moohiwah deekana.	His.	Souhtuk.	Calabash.
Amiseeka.	Sister.	Mahbootoring.	Fighting.
Passingka.	Father.	Koomah.	Salt.
Mamaka.	Mother.	Koomhoo.	Rabbit.
Kahaloo.	Shirt.	Backar kee.	Children.
Kahasong.	Trowsers.	Oo.	House.
Cococo.	Cocoa-nut.	Assun.	Hill.
Almuk.	Male.		
Tooroo.	Cattle.	Aslar.	One.
Pamka.	Horse.	Bou.	Two.
Boorroo.	Donkey.	Bas.	Three.
Mulah.	Mule.	Aroonca.	Four.
Malakah.	Indian rabbit.	Seenca.	Five.
Kookmik.	Armadillo.	Deecca.	Six.
Hoombooka.	Bird.	Yecca.	Seven.
Ooli.	Turtle.	Bachca.	Eight.
Taspool.	India-rubber.	Tingnicaslar.	Nine.
Deehlatookuting.	Cooking.	Tingniskoobou.	Ten.
Pun.	Tree.		

MOSQUITO VOCABULARY.

Narra bal.	Come here.	Pies.	Eat.
Eine.	Make haste.	Ploom.	Victuals.
Kaiser.	Let us go.	Dies.	Drink.
Douce.	Stick.	Lia.	Water.
Yerri.	Long.	Lia Kowta.	Cold water.
Clucki.	Cut.	Wano.	Come along.
Brebal.	Bring it here.	Apia.	No.
Yany.	Mine.	Aou.	Yes.
Man.	Your.	Yabra.	North.
Eisiken.	Father.	Blanco.	South.
Yapti.	Mother.	N'emopera.	Go this side.
Mooine.	Eldest brother.	Passer.	Wind.
Deevra.	Youngest brother.	Keero.	Knife.
Lakreka.	Sister.	Rakboos.	Gun.
Tahte.	Uncle.		
Yapti deevra.	Aunt.	Kumi.	One.
Damer.	Grandfather.	Wal.	Two.
Kookah.	Grandmother.	Yumpa.	Three.
Pearker.	Widow.	Walwalun.	Four.
Mair.	Wife.	Matasip.	Five.
Mair waikna.	Husband.	Mata walkaby.	Six.
Mairen.	Woman.	Mata walkabykumi.	Seven.
Waikna.	Man.	Matawal wal.	Eight.
Lilla.	Mistress.	Matawal yumpa.	Nine.
Almuks.	Old man.	Matawal sip.	Ten.
Hupla.	People.	Youan eiske.	Twenty.
Mehi.	Friends.	Youan eiske wal.	Forty.

The PRESIDENT said, as Englishmen they must all be proud of Mr. Collinson, a civil engineer who had shown so much skill and perseverance in surmounting the difficulties of this original survey of a wild country, and had laid before them geographical data of considerable importance. He would first call upon Captain Bedford Pim, who was the original projector of this traverse of the isthmus, and who had previously distinguished himself by his researches in the Arctic regions.

Captain BEDFORD PIM said the able paper of Mr. Collinson left him hardly scope for saying a word upon the subject. There was one point it might be

desirable to mention, which was, that Mr. Collinson's feat was absolutely the first spirit-level survey across Central America, with the exception of that undertaken for the Panama Railway. He had great pleasure in bearing testimony to the ability of Mr. Collinson. Few people were aware of the amount of hardship and difficulty met with in cutting through the dense forests of Nicaragua. Mr. Collinson surmounted every obstacle with a degree of bravery and perseverance which deserved high praise, and had it not been for his great exertions he (Capt. Pim) should have had to return to England for the third time disappointed in opening up this hitherto unknown tract of country. Lieutenant Oliver of the Royal Artillery, already well and favourably known to this Society, was also entitled to much credit for the able manner in which he assisted Mr. Collinson, in the traverse from the lake to the shores of the Atlantic.

Captain MAURY (U.S.), after acknowledging the great services which Captain Pim had rendered to the commerce of the world by projecting and carrying out the Nicaragua route, observed that he had rendered no less a service to geographical science. He and his able assistants had made us acquainted with the geography of these regions, and given us an amount of information which we never possessed before. He (Captain Maury) was of opinion that the Nicaragua route would be preferable to the Panama one for crossing to the Pacific. All that country was liable to what are called periodical rains. A belt of cloud might be considered as extending in these latitudes from the coast of Africa across the Atlantic to the shores of America. This cloud-belt moved from north to south with the sun in declination. It went as far south as lat. 3°. When it came north it passed over Panama and Mexico, and was the source of the periodical rains in those regions. But the effect was the annual occurrence of a long period of calm in the Pacific near Panama, which rendered that part difficult of access by sailing vessels, an objection which did not apply to the ports of Nicaragua, where these calms are unknown. When he was in Mexico two years ago he had the honour of calling the attention of the Emperor Maximilian to the subject of investigating the phenomena of this cloud-belt, with its accompanying rainy season. His Majesty, with that enlightenment which was his characteristic, authorised him to procure instruments from London, with a view to the establishment of not less than 62 meteorological observatories in Mexico, which were placed under the direction of the Geographical Society of that country. He was surprised to find this Mexican Society in so flourishing a condition. For many years, notwithstanding the revolutions in that country, it had been pursuing its quiet work, publishing its journals from time to time, and holding regularly its meetings. He could not tell what had become of the instruments; but he thought it was worthy the attention of the Council of the Royal Geographical Society of London whether they would not open a correspondence with the Mexican Society, with the view of obtaining from them the observations which these instruments were sent to procure.

Admiral Sir EDWARD BELCHER said, perhaps as surveyor of the whole of the Pacific coast of Central America, a word from him might not be unimportant. He questioned if any of the persons who had spoken had any personal knowledge of that coast, or of the climate, the winds, or the facility of travelling along the coast. When he was there he never had any difficulty in getting in and out of the Bay of Panama. He was glad to hear that a route had been surveyed across Nicaragua, but he thought the proposed line started from an awkward part of the coast on the Atlantic or eastern side, where there was great difficulty in effecting a landing. It would not be easy to find anchorage for ships; neither was there any harbour on the opposite or Pacific side; and the frequent gales of wind on that coast termed Papagayos would dismast any ship that attempted to approach it from seaward under canvas. A little to

the southward there was a splendid harbour, perfectly free from gales. If the party had run their line further to the south-west, through Costa Rica, they would have found a fine country. On the other hand, in the Bay of Honduras, a line had been examined by Mr. Squiers, many years ago, and found to be practicable; while the Gulf of Fonseca to the southward, where that line terminates, would contain the whole navy of England. On these accounts he would have preferred a more northerly line through Honduras,—a country infinitely richer in every way than Nicaragua, with a better climate, and perfectly free from those insect pests which were found further south. With respect to the communication between Colon and Panama, he never heard till this evening that there was any difficulty in landing at Colon; and on the Panama side, from 1837 to 1840, he was in the habit of sending the *Starling* tender under Captain Kellett backwards and forwards with despatches, with such certainty that he knew almost to a day when he would arrive. All the accounts about the difficulties of the Bay of Panama he could not comprehend, for he never experienced bad weather or a gale of wind there in his life.

Commander PEACOCK said he had surveyed the coast of Nicaragua as far back as 1831, and had the honour of discovering that the coast-line had been laid down 58 miles of longitude in error on all the maps and charts previous to that time, which was afterwards verified by Capt. Owens, R.N., in H.M. surveying ship *Blossom* in 1832, as the discovery was considered so important that the Commander-in-Chief ordered this ship to proceed to the Mosquito coast on purpose to ascertain the truth of this extraordinary error, which had remained for upwards of *three centuries* in all the maps and charts of the world. This coast was discovered by the immortal Columbus in the month of September, 1502, when on his fourth voyage. Mr. Peacock had also had the honour of surveying the Isthmus of Panama from ocean to ocean, and of commanding the first steamship that ever visited Panama, in February, 1842. He also had the honour of calling attention in 1831 to the route across Lake Nicaragua by steamers of light draft and by railway to St. Juan del Sur, and his letter on the subject would be found in the archives of the Admiralty, with this comment—"should the *west* coast of Nicaragua be laid down correctly, the eastern coast being so much in error, the distance across to the Pacific would, by this singular discovery, be 60 miles shorter than hitherto supposed by geographers." Mr. Shepherd told him that he had taken a schooner drawing 6 feet of water up the Colorado branch of the river to Lake Nicaragua; and also that the ground between the lake and St. Juan del Sur was very easy for carrying a railway across. He (Mr. Peacock) had also explored the river St. Juan to its junction with the Colorado branch, and could endorse all that Mr. Collinson had stated in the able and interesting paper they had had the pleasure of listening to, in respect of climate and the numbers of jaguars, alligators, &c., met with in the jungle and on the banks of the rivers on that coast. In the letter he had had the honour of addressing to Admiral Colpoys in November 1831, he named an excellent suggestion of Mr. Shepherd's, viz., that if the Colorado branch of the St. Juan were to be dammed across, at its confluence with the latter, falling into the harbour of St. Juan, he believed it would scour a deep water-channel from thence into the harbour, and enable vessels of some draft to ascend at once to the lake. With respect to the remark made by Mr. Collinson as to large vessels having been said to have ascended the St. Juan in the early voyages of the Spaniards, it is not improbable that the Colorado branch may be comparatively of *recent* origin, which would account for the shallow condition of the St. Juan itself at this time, for the hydrographical changes that have taken place ever since 1831, by the growing out of Point Arenas upwards of $1\frac{1}{2}$ mile in length in less than 30 years, is one of the most remarkable changes, by natural causes, known; for what was a good harbour from 1831 to 1857, with anchorage for a fleet of large ships, having deep water on both sides of

this natural dyke, became converted into a lagoon in 1859, by the spit joining the mainland—soon after which the harbour was shut up.* Capt. Freeman, of the sloop *Countess of Belmore*, employed in the shell-turtle fishery on that coast, told Capt. Peacock that rich mines of gold and silver existed a few days' journey inland from Blewfields to the northward of St. Juan, which doubtless were those now known as the Chontales mines.

Dr. SEEMANN would speak as to the feeders of the projected railway; he had twice explored the greater part of Nicaragua under the direction of Captain Pim. His route lay from Leon north-eastwards. After leaving Leon, and for four or five days' journey, the climate gradually became delightfully fine. He went up as far as the boundary of Honduras, and found there extensive mining operations going on, the ore being chiefly of silver. He then went southward to Chontales, the new gold region, which had been brought into notice by Captain Pim. The climate of the Pacific side of Nicaragua is comparatively dry, and the rainy season short. After passing to the east of the lake the rainy season becomes prolonged several months, the rains continuing till February, while in other parts they cease in November. The vegetation on the Pacific side is similar to that near Panama; but at Chontales it is much more luxuriant, and the timber there is finer than it is on the Pacific side. The whole of the Chontales forest is a virgin forest. At his suggestion a meeting had lately been held in Chontales to ascertain the possibility of cutting a route from Chontales to the Blewfields settlement. He had found that several people had made their way to the coast; and he was glad to say that a route was now being cut under the direction of Colonel Maury, and by order of the Javali Company.

Mr. J. H. MURCHISON observed that Admiral Belcher, while speaking of the Honduras route, had forgotten that no proper survey had been made across Honduras; whilst at Nicaragua a most elaborate and able survey had been carried out. More than that, a transit route had already been in operation across Nicaragua to St. Juan del Sur. Another circumstance in favour of the route proposed by Mr. Collinson was that the United States Government, about two years ago, had sent a staff of engineers to survey the Atlantic coast of Central America, under the charge of Captain West, who, after pronouncing the harbour of Grey Town impracticable, and making a special survey of the harbour at Monkey Point, had stated that this was the harbour on the Atlantic which could be made the most practicable for commercial purposes. Again, the climate was finer than at the Isthmus of Panamá, and the distance from New York and Liverpool to San Francisco, by the Nicaragua route, was considerably shorter than by the Panamá or the Honduras route.

The BISHOP of HONOLULU said he had made several transits over the Isthmus of Panamá, and could not concur in the ground taken by the advocates of the Nicaragua route, viz., that the one over Panamá was unhealthy. In 1862 he stayed most part of a week there with his wife and children, and two clergymen with their families, and they found the place healthy, and suffered no inconvenience. The intelligent Consul there, Mr. Henderson, had often said, as a tropical climate, that of Panama city was one of the very best, and that he enjoyed there very good health. At Aspinwall or Colon, on the Atlantic side, the manager of the railway, who had had an experience of above ten years' residence there, with his family, said, "if a person took the proper precautions usual in the tropics, and was careful about stimulants, for example, he might live as long there as anywhere else." The chaplain had told him (the Bishop) the same. He mentioned these facts in vindication of the

* See Plan of Port St. Juan surveyed by Mr. Peacock in 1831, with the gradual growth of the spit from year to year up to December, 1858, in the Map Collection of the Royal Geographical Society.

Panamá railway route, from whose managers he (the Bishop) had ever received much personal kindness and attention.

Admiral OMMANNEY said he was stationed off the coast of Central America in command of H.M.S. *Brunswick*, 80 guns, for five months, most of that time lying off Colon, and could confirm all that the Bishop had just said as to the salubrity of Colon and the advantages of the Panamá railway. The climate of that locality when the railway was first commenced was in bad repute; since then it had improved, owing to the clearance of timber and vegetation along a belt of country on each side of the line, through the dense virgin forest which covers the Isthmus: the prevailing wind which blows from the N.E. direct from the sea over Colon renders that place healthy. His ship's company, consisting of upwards of 800 persons, enjoyed good health; he had the satisfaction to leave the station without the loss of a man by death from the climate. The present survey of Nicaragua, with regard to opening out an access into that country, was a good work accomplished, and reflected very great credit on those who had conquered the difficulties and privations; any work tending to develop the natural sources of wealth in Central America was a benefit to mankind. The proposed line as a means of interoceanic communication between the Atlantic and Pacific would be of little value unless there were good ports at each terminus capable of receiving the largest passenger ships: on this point he was sceptical. He had visited the Mosquito coast, and feared that no harbour existed at Monkey Point suitable for the object. He considered it a dangerous coast and subject to boisterous weather; he was once caught off Monkey Point on a lee-shore with a heavy gale, in a line-of-battle-ship; had difficulty to work off under storm-sails, aided by steam-power, against the heavy sea rolling along the coast. The advantage of the short transit by the existing Panamá line, which has good towns at each terminus, would command the preference for passengers to the more lengthened route by the proposed scheme.

Mr. COLLINSON, in reply, adverted only to one point—the harbour at Monkey Point. He had had considerable experience of that harbour as to shelter: In 1863, in one of the most violent northers on that coast, he was for three days, in that harbour, in one of the Royal Mail steamers, and was completely sheltered. On the contrary, at Colon, during one of these northers, the Royal Mail steamer *Avon* was blown right on shore against the landing stage, which was entirely destroyed. She could not get out with full steam on.

The meeting then adjourned.

Third Meeting, December 9th, 1867.

SIR RODERICK I. MURCHISON, BART., K.C.B., PRESIDENT, in the Chair.

PRESENTATIONS.—*Rev. A. Raleigh, D.D.*; *Edward Spicer, Esq.*; *J. H. Tritton, Esq.*

ELECTIONS.—*Frederick Shirley de Carteret Bisson, Esq.* (Lieut. R.I. Militia); *James Chapman, Esq.*; *Andrew Halley Knight, Esq.*; *William McArthur, Esq.*; *Hon. John McLean, Esq.*; *Richard Ramsden, Esq.*, B.A. Trin. Coll., Cambridge.

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—‘Voyage sur le Coté Orientale de la Mer Rouge dans le pays